

Solution Homework 22

There are no right or wrong answers, as the maintenance policy is chosen case-specifically on an economic basis. However, we can imagine situations where certain policies would work better than others.

- a) **Repair:** Benefit of maintenance low compared to distress of malfunction. Impact of malfunction low/repair cheap or quick/maintenance difficult, expensive or otherwise not very beneficial.

Practical examples:

- Light bulb: We change the light bulb when it stops shining. No action needed before that.
- Screen of smartphone: No need to do much to the screen before it breaks (perhaps clean it, but that does not affect its lifespan). When broken, we change to a new screen.
- Doorbell: You easily notice a broken doorbell, and your guests will find their way in anyways. Checking the condition of the doorbell regularly is a waste of time and may annoy the people you live with.

Preventive maintenance is used in order to avoid expensive repairs and/or failures with dire consequences. The choice between condition based and time based maintenance is case specific, but we could e.g. use condition based preventive maintenance when the condition can be checked fairly easily, and time based maintenance if the condition is difficult to check or maintenance is needed regularly.

- b) **Condition based preventive maintenance**

- Bicycle maintenance: The condition of a bicycle is checked fairly easily, and it should be fixed if riding it is not safe (e.g. breaks not working, bicycle chain in risk of jamming).
- Water systems: Monitoring the pressure in a pipe allows maintenance before a leak occurs. The water damage caused by a leak may be severe.
- Nuclear power plants: Maintenance done based on plant and component conditions, which are continuously monitored. Condition-based maintenance is important to avoid disastrous nuclear plant accidents.

- c) **Time based preventive maintenance**

- Machine in amusement park: Malfunction may have lethal consequences, so it is important to regularly check that the machine is in perfect state.
- Fire alarm: Should be checked regularly. Does not save lives if broken.
- Car maintenance: We know quite well in advance when oil needs to be changed etc. Therefore, time based maintenance works well.